

EXPLANATION

- |                                   |   |                                    |
|-----------------------------------|---|------------------------------------|
| <b>Symbols for historical map</b> | <b>Features</b>                                     | <b>Symbols for present-day map</b> |
| —                                 | Shoreline   | —                                  |
| ---                               | Mean lower low-water line                           | ---                                |
| ---                               | Boundaries for agricultural plots                   | ---                                |
| Not applicable                    | Dikes or levees                                     | ---                                |
| ---                               | Subaerial wetland (salt-water or fresh-water marsh) | ---                                |
| ---                               | Intertidal wetland                                  | ---                                |
| ---                               | Forested upland                                     | ---                                |
| ---                               | Grassland   | ---                                |

NOOKSACK RIVER AND BELLINGHAM BAY,  
AND LUMMI RIVER AND LUMMI BAY

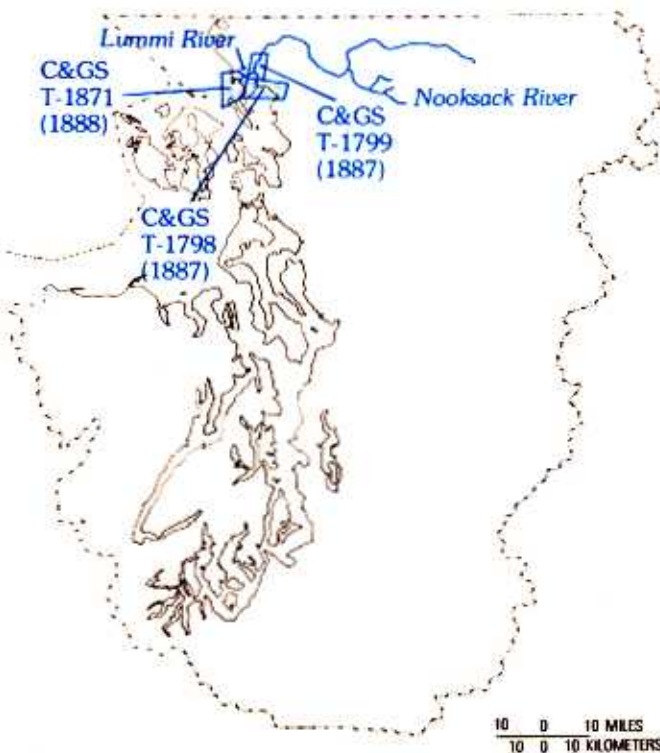
**Setting**  
The Nooksack River basin is in the northern part of the Puget Sound region immediately adjacent to the Canadian border. The delta plains of both the Nooksack and Lummi Rivers are located within the Lummi Indian Reservation. The Nooksack River delta plain is mostly undeveloped and includes both forested and nonforested wetland. The delta plain of the Lummi River has been diked and drained for agricultural use.

**Shoreline and Wetland Changes**  
**Nooksack River Delta**  
In the last several thousand years, the Nooksack River apparently has alternately used two main lower channels—the Lummi River which flows into Lummi Bay and the present channel which empties into Bellingham Bay. Since the 1887–88 mapping, the subaerial part of the Nooksack River delta has prograded seaward about 1.5 km, or 9 miles, from its former position. This relatively rapid sediment accumulation of the Nooksack River delta may be due in part to a major channel shift in recent times. The shift reportedly was caused about 1860 (before the source maps were made) by a log jam 7.2 km (4.5 mi) upstream from the present-day river mouth, which changed the course of the river from its former outlet in Lummi Bay to Bellingham Bay, where it has remained ever since (U.S. Army Corps of Engineers, 1973).

The shoreline area from the Nooksack delta around an intervening point of high land to the present Lummi River lies within the Lummi Indian Reservation, and has remained largely undeveloped. There was no non-Indian settlement on the Nooksack delta before 1860 (Howard Droker, written commun., 1978). At present, the delta plain remains in a relatively natural state, but upstream from a point 2.1 km (1.3 mi) above the present mouth, the main channel of the river is diked, and the lands behind the dikes are drained for agricultural purposes. Since the early mapping, the lower Nooksack River channel has migrated from the western to the eastern half of the delta.

The present Lummi River delta is not influenced by the dynamic river environment of the past, when most of the streamflow from the Nooksack River flowed through it to Lummi Bay. At present, the Lummi River receives an occasional small amount of flood-stage overflow from the Nooksack River, but otherwise its channels carry local runoff and discharging groundwater. Since the 1887–88 mapping, the positions of the channels and shoreline of the delta have remained approximately unchanged.

**Compilation of Map**  
The 1887–88 topographic surveys, T-1798, T-1799, and T-1871 were used as source material for map compilation. In the area along the upper Lummi River, the Indian Reservation boundary and old roads provided cultural references for scale registration and control. In the remaining areas, topographic features and the sparse road system served as control for data transfer. Because the three source maps do not overlap, the upper limit of the marsh north of Slater and Smuggler Sloughs is undefined.



SOURCE MAPS FOR COMPILATION OF HISTORICAL SHORELINE AND LOCATION OF RIVER-MOUTH DELTA

TABLE 1.—Summary of Environmental Changes and Some Planning Considerations  
Nooksack River delta

Progradation (seaward advance of shoreline)	Substantial; delta has prograded seaward about 1.5 km. The net amount of subaerial land gained is about 3 sq km.
Recession (landward retreat of shoreline)	None apparent.
Channel migration	Substantial. The main river channel has shifted significantly in the past from the western to the eastern half of the delta. Since the main river channel has migrated, the natural channel has straightened, presumably by natural processes.
Channel straightening	None apparent.
Diking or substantial filling of subaerial delta land near salt-water shoreline	None apparent.
Diking or substantial filling near stream banks	The river has not been diked at the lower reaches of the delta, but dikes have been placed in the upper reaches of the delta beginning about 2.1 km upstream from the river mouth.
Other artificial landfill on subaerial delta land	None apparent.
Landfill on intertidal delta land	None apparent.
Loss of subaerial wetland	Most of the original wetland has been converted to farmland, but because of the prograding nature of the delta, the net loss of wetland has been insignificant (table 2). At present, the delta remains in a relatively natural state of forested and non-forested wetland. The present-day wetland actually covers an area greater than shown on the modern (1972) topographic map.
Loss of intertidal wetland	None. The present-day intertidal area is about 1.8 sq km greater than that mapped in 1887–88 (table 3).
Some planning considerations	The delta is in a near-natural state and is the least altered by man's activities of those studied. The wetland and shoreline, if managed properly, could retain the benefits of valuable fish and wildlife habitat. The rapidly prograding Nooksack River may have a long-term effect on maintenance of navigational channels in Bellingham Bay.

TABLE 2.—Summary of Environmental Changes and Some Planning Considerations  
Lummi River delta

Progradation (seaward advance of shoreline)	None apparent.
Recession (landward retreat of shoreline)	Erosion of the former shoreline appears to have taken place, possibly in response to loss of sediment supply from the Nooksack River.
Channel migration	A major shift of the lower Nooksack River from the Lummi delta into the present Nooksack delta in about 1860 has virtually eliminated migration of stream channels over the Lummi delta.
Channel straightening	None apparent.
Diking or substantial filling of subaerial delta land near salt-water shoreline	Dikes have been placed along entire delta seashore.
Diking or substantial filling near stream banks	The main river channel of the Lummi River has been diked from the mouth of the river to about 4.5 km upstream.
Other artificial landfill on subaerial delta land	None apparent.
Landfill on intertidal delta land	An earthen dike of the Lummi Indian Tribe encloses an aquaculture pond of about 2.6 sq km.
Loss of subaerial wetland	About 0.3 sq km of wetland remain from 5.8 sq km mapped in 1887; of this, about 0.5 sq km of former wetland at Sandy Point Shores has been converted to residential use and the rest to agricultural land (table 2).
Loss of intertidal wetland	Some. The present-day intertidal area is about 1.0 sq km less than that mapped in 1887–88 (table 3).
Some planning considerations	The natural reduction in flow of the Lummi River and the blocking of sloughs by dikes have reduced habitat available for fish and wildlife. The delta plain, especially near the Lummi River channel, is not completely free of flood hazard; the Nooksack River is largely uncontrolled (except for dikes and levees) and might again resume its former channel through Lummi River during some exceptionally large flood in the future.

HISTORICAL CHANGES OF SHORELINE AND WETLAND AT LUMMI RIVER AND LUMMI BAY AND NOOKSACK RIVER AND BELLINGHAM BAY, WASHINGTON

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